

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Original) A fastening element, comprising:
 - a mandrel including a foot and a head, the head having a head diameter greater than a mandrel diameter; and
 - a hollow shank including:
 - a setting head at a free end;
 - a deformation segment operably forming a closure head;
 - a connecting segment configurable inside the shank operably forming a tension-resistant connection with the mandrel foot; and
 - a shank end opposed to the setting head having a punching edge extending substantially along an outermost periphery of the shank.
2. (Currently Amended) The ~~fastening element~~ system of Claim [1]] 21, wherein the shank and the mandrel are positively connectably geometrically.
3. (Currently Amended) The ~~fastening element~~ system of Claim [1]] 21, wherein the shank and the mandrel are detachably connectable.
4. (Currently Amended) The ~~fastening element~~ system of Claim 3, wherein the shank and the mandrel are threadably connectable.

5 . (Currently Amended) The ~~fastening element~~ system of Claim [[4]] 21, wherein the mandrel foot and the shank end are threadably connectable.

6 . (Currently Amended) The ~~fastening element~~ system of Claim [[5]] 21, comprising:

the mandrel foot including an external thread; and

the shank end including an internal thread engageable with the external thread of the mandrel foot.

7 . (Currently Amended) The ~~fastening element~~ system of Claim [[1]] 21, comprising:

the mandrel foot having a first diameter; and

an outside of the shank end having the punching edge formed thereon having a second diameter;

wherein the first diameter is one of equal to and greater than the second diameter.

8. (Cancelled)

9 . (Currently Amended) The ~~fastening element~~ system of Claim ~~[[1]]~~ 21, wherein the setting head comprises a diameter greater than any one of a deformation segment diameter, a shank end diameter and a mandrel foot diameter.

10 . (Currently Amended) The ~~fastening element~~ system of Claim ~~[[1]]~~ 21, wherein the ~~fastening element~~ fastener ~~is comprises~~ a metal.

11 . (Currently Amended) The ~~fastening element~~ system of Claim 10, wherein the metal comprises at least one of ~~steel~~, aluminum and an aluminum alloy.

12 . (Currently Amended) The ~~fastening element~~ system of Claim ~~[[1]]~~ 21, wherein a cross section of the fastening element is substantially circular.

13 . (Currently Amended) The ~~fastening element~~ system of Claim ~~[[1]]~~ 21, wherein a cross section of the fastening element is substantially polygonal.

14 . (Currently Amended) The ~~fastening element~~ system of Claim ~~[[1]]~~ 21, wherein the mandrel head comprises a fastener driving element.

15 . (Currently Amended) The ~~fastening element~~ system of Claim ~~[[1]]~~ 21, wherein the shank comprises an open end.

16 . (Currently Amended) The ~~fastening element~~ system of Claim ~~[[1]]~~ 21, wherein the shank comprises a closed end.

7-20. (Cancelled)

21 . (Currently Amended) A fastener setting system, comprising:
a fastener including:
(i) a ~~first~~ non-frangible mandrel having a foot; and
(ii) a hollow shank including:
(a) a setting head at a free end;
(b) a deformation segment for forming a closure head;
(c) a connecting segment configurable inside the shank operably forming a fastenable connection with the mandrel foot; and
(d) a shank end opposed to the setting head having a ~~punching~~ workpiece-self piercing edge extending substantially along an outermost periphery of the shank;
a die;
a ram ~~including a second mandrel~~ detachably connectable to the mandrel and operably advancing the ~~[[fastening element;]]~~ fastener toward the die
~~a holding tool to hold the setting head against a work, the ram and the holding tool being movable relative to the die independently of each other.~~

22. (Original) A device, comprising:

a fastening element having a setting head and a mandrel engageable into at least one part;
a die;
a ram operably punching the fastening element through the at least one part;
a holding tool operably holding the setting head against the at least one part; and
a traction tool operably retracting the mandrel;
wherein the ram and the holding tool are movable relative to the die independently of each other.

23. (Original) The device of Claim 22, wherein the mandrel comprises an external thread operably forming a releasable connection with the fastening element.

24. (Original) The device of Claim 22, wherein the die comprises a disposal passage operably disposing each of a plurality of punched parts.

25. (Original) The device of Claim 22, comprising a counterforce structure operable to dynamically interlock the ram and the die.

26. (Original) The device of claim 22, comprising at least one of:
a moving means;

a means for determining a ram position;
a means for determining a holding tool position; and
at least one force sensor operably detecting a force involved in
setting a rivet.

27. (Original) A fastening element system, the system comprising:
a fastening element including:
a mandrel; and
a hollow shaft including:
a setting head at a shaft first end;
a deformation segment operably forming a closure
head;
a connecting segment configurable inside the shaft;
and
a shaft second end opposed to the setting head
having a punching edge extending substantially along an outermost periphery of the
shaft;
a die operable to create a punch opening having a variable
diameter in the at least one part, the die including at least two segments operably
absorbing a punching force and operably forming the punch opening capable of
accommodating the closure head of the fastening element;
a die receptacle having the segments movably lodged therein; and
at least one spring element operably holding the segments

together.

28. (Original) The system of Claim 27, wherein the segments are radially displaceable.

29. (Original) The system of claim 27, comprising:
each segment including a planar bearing surface; and
the die receptacle including a substantially planar countersurface
operably transmitting the punching force to the die receptacle.

30. (Original) The system of Claim 27, wherein each segment comprises a spring element receptacle.

31. (Original) The system of Claim 27, wherein the die receptacle comprises an annular stop.

32. (Original) The system of claim 31, further comprising:
the annular stop including an annular stop surface; and
each segment including a segment stop surface;
wherein the segment stop surface is positionable behind the
annular stop surface in relation to the at least one part by a distance ranging between
0.1 to 0.3 mm, the distance operably ensuring mobility of the segments during a
fastening element setting operation.

33. (Original) The system of Claim 32, wherein the distance ranges between 0.15 mm to 0.25 mm.

34. (Currently Amended) The system of Claim 27, comprising less than five of the segments.

35. (Original) The system of Claim 27, wherein the spring element comprises a rubber ring.

36. (Original) The system of Claim 27, wherein the spring element comprises a spiral ring.

37. (Original) The system of Claim 27, wherein the die comprises a transversely extendable vent hole.

38. (Original) The system of Claim 27, wherein the punch opening formable by the segments comprises a rotationally asymmetrical cross section.

39. (Original) The system of Claim 38, wherein the punch opening comprises a substantially polygonal cross section.

40. (Original) The system of Claim 39, wherein the punch opening comprises a

tooth when viewed in cross section.

41-50. (Cancelled)

51. (New) A rivet setting system comprising:

a blind rivet comprising a mandrel threadably engageable with a shank,
the shank having open ends;

a workpiece;

a machine operable to rotate the mandrel relative to the shank in order to
expand a portion of the shank and retain the shank within a hole in the workpiece; and

an accessory secured to the workpiece by the mandrel.

52. (New) The system of Claim 51, wherein the machine comprises a ram, a
holding tool and a tension tool.

53. (New) The system of Claim 51, wherein the machine comprises a die
including movable die segments surrounding a central passageway.

54. (New) The system of Claim 51, wherein the machine comprises a force
sensor.

55. (New) The system of Claim 51, wherein the mandrel includes an enlarged
head.

56. (New) The system of Claim 51, wherein the shank includes a flanged head.

57. (New) The system of Claim 51, further comprising a second workpiece retained to the first workpiece by the shank, a portion of the shank being disposed between the workpieces and the accessory.

58. (New) A rivet setting system comprising:

a rivet;

a ram operably advancing the rivet; and

a die comprising die segments movably located about a central passageway, the die segments including formations operably deterring undesired rotation of the rivet.

59. (New) The system of Claim 58, wherein the rivet includes a mandrel engageable with a shank and movement of the mandrel relative to the shank expands a portion of the shank.

60. (New) The system of Claim 59, wherein the mandrel is threadably engageable with the shank.

61. (New) The system of Claim 59, wherein the mandrel is non-frangible.

62. (New) The system of Claim 59, wherein the mandrel includes a frangible stem and an enlarged head opposite the ram.

63. (New) The system of Claim 58, wherein the ram includes a mandrel and the rivet includes an expandable shank, the mandrel being threadably engageable with the shank.

64. (New) The system of Claim 58, wherein the formations of the die segments include inwardly projecting teeth.

65. (New) The system of Claim 58, wherein the formations of the die segments include offset surfaces.

66. (New) The system of Claim 58, wherein the rivet is a blind rivet.

67. (New) A fastener setting system comprising:

- a mandrel;

- a fastener including a shank, the mandrel acting to expand the shank;

- a machine operably advancing the shank and rotating the mandrel relative to the shank; and

- a sensor operably monitoring a characteristic associated with movement of at least one of the mandrel and the shank.

68. (New) The system of Claim 67, wherein the machine comprises a ram, a holding tool and a tension tool.

69. (New) The system of Claim 67, wherein the machine comprises a die including movable die segments surrounding a central passageway.

70. (New) The system of Claim 67, wherein the sensor is a force sensor monitoring traction and punching.

71. (New) The system of Claim 67, wherein the mandrel includes an enlarged head.

72. (New) The system of Claim 67, wherein the shank includes a flanged head.

73. (New) The system of Claim 67, wherein the mandrel is threadably engageable with the shank.

74. (New) The system of Claim 67, wherein the mandrel is non-frangible.

75. (New) The system of Claim 67, wherein the machine includes a fastener-advancing ram, and the mandrel includes a frangible stem and an enlarged head opposite the ram.

76. (New) The system of Claim 67, wherein the mandrel is part of the machine and is used with multiples of the fastener.